DOCUMENT RESUME

ED 084 581 CS 500 464

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TITLE Prisoner's Dogmatism Scores and Creative Alternative Game Behavior under Full Communication and Real Reward Conditions: A Correlational Study.
PUB DATE Nov 73
NOTE 22p.; Paper presented at the Annual Meeting of the Speech Communication Assn. (59th, New York City, November 8-11, 1973)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Behavioral Science Research; Communication (Thought Transfer); *Conflict; *Dogmatism; *Game Theory; Information Theory; *Prisoners; Problem Solving
IDENTIFIERS *Creative Alternative Games

ABSTRACT

To extend information on communication to game theory, a study was conducted (1) to determine whether there was a relationship between dogmatism of players in a creative alternative game and their game behavior, and (2) to compare the behavior of federal prison inmates playing a game under conditions of real rewards and full communication opportunities with college students under similar conditions. After completing dogmatism tests, 20 prisoner subjects were assigned to pairs, according to test scores, for the creative alternative game. Results of the 37 game trials supported the assumption that "low dogmatic" pairs would arrive at more "creative" solutions than "high dogmatic" pairs. Comparison of the prisoner results with those of the four college experiments indicated that the percentage of cooperative responses were similar in both groups, "low dogmatic" pairs in both groups tended to behave much the same, but "high dogmatic" pairs in the prison group tended to play more cooperatively than in the college samples. Ultimately, findings about the influence of the dogmatism variable on communication behavior still remain inconclusive. (RN)

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PRISONERS' DOGMATISM SCORES AND CREATIVE ALTERNATIVE GAME BEHAVIOR UNDER FULL COMMUNICATION AND REAL REWARD CONDITIONS: A CORRELATIONAL STUDY

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Speech Communication Association

New York

November 8-11, 1973

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CS 500 464

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PRISONERS' DOGMATISM SCORES AND CREATIVE ALTERNATIVE GAME BEHAVIOR UNDER FULL COMMUNICATION AND REAL REWARD CONDITIONS: A CORRELATIONAL STUDY

Knowledge about aggression, trends, power, trust, bargaining, and other information generated within the disciplines of ethology, psychology, sociology, political science, and economics, have contributed to the development of theories of conflict. Rapoport (1970) identifies two more recent theoretical frameworks within which conflict has been studied "as a phenomenon....regardless of its origin or content":

> One is system theory, which, applied to the large organized social aggregates, views conflict as an interplay of forces, pressures, or stresses inherent in the structure and dynamics of such aggregates. The other is game theory, concerned with the strategic aspects of conflict.[1]

Since the publication of von Neumann and Morgenstern's (1947) fundamental treatise on game theory,[2] both the nature of research and the scope of application of game theory as a mathematicized strategic science has been broadened. Investigators have had greatest success in determining optimimal strategies which can be prescribed in two-person, constant-sum games in which important conflicts are bipolarized. Such research is reported in Kuhn and Tucker (1953),[3] Luce and Raiffa (1957),[4] Schelling (1960),[5] Drescher, Shapely, and Tucker (1964),[6] Shubik (1964),[7] Rapoport and Chammah (1965),[8] and Swingle (1970).[9]

Communication researchers in the past have offered little toward building game theoretic models of conflict principally because the emphasis of game theorists on constant-sum, basic bargaining problems has not proved a similarly fruitful area of study for communication investigaters. In such games, message transmissions between parties usually serve only to change reaction speed throughout the game, not the outcome of the game, i.e., "...the solution ultimately achieved via communication would not be different from that achieved without communication."[10] However,

investigations of mixed motive, nonconstant-sum games, in which the interests of the participants are partially opposed and partially congruent have offered a more interesting setting for communication research. Within the context of this game theory research, there have been three major thrusts to the study of communication behavior during conflict conditions (in contrast to pre-game or intra-side communication): (1) studies of coalition formation; (2) studies of bargaining over allocation of rewards or losses; (3) studies of the effects of communication on game behavior.[11]

The present study is representative of the third approach. The purpose in conducting this experiment was twofold:

1) to determine whether there is a relationship between dogmatism levels of players in a Creative Alternative game and their game behavior under real reward and full communication conditions.

2) to compare the behavior of federal prisoners playing the game under real reward and full communication conditions with the results obtained by Steinfatt in studies of college students under similar conditions.

The rationale for the investigation is presented below.

Communication

Theories for the solution of nonconstant-sum games may be classified broadly as proposing noncooperative or cooperative solutions. The latter group are of particular interest here because they suggest that in games rational individuals strive for gains, gains are realized through cooperation, and communication facilitates cooperation. The more prominent cooperative solution theories are those of von Neumann and Morgenstern (1945), Nash (1951), Shapley (1953), Harsanyi (1962), Aumann and Maschler (1964),[12] Rapoport and Chammah (1965),[13] Shubik (1970).[14] Steinfatt (1972) has also developed a Creative Alternative game in which communication is central to achieving an optimum, cooperative strategy (the payoff matrix is presented in Fig. 1, p. 8).

Unlike the Prisoner's Dilemma game, in which the matrix itself dictates the strategy which will yield the highest rewards for both players and in which communication is unnecessary after players have determined this fact and have agreed to cooperate, the Creative Alternative game yields maximum rewards to both players only if they agree to side payments from a strategy which has no rational basis and would not be possible consistently without communication (i.e., it is inconceivable that one player will accept - 2 points reward each trial so that the other player can obtain 20 points each time unless both have negotiated a split of the payoffs).[15] The establishment of a full communication condition also eliminates one of the problems with previous studies of communication in games: communication effects have been confounded with the effects of playing n-trials of the game before communication is allowed.

Rewards

Previous studies (Gallo, 1963; Gallo and McClintock, 1965; Terhune, 1970)[16] have stressed the difference between real reward and imaginary reward in game situations. It is argued that if rewards have little perceived value players attempt to maximize the difference between themselves and their opponents, rather than playing to maximize their own rewards. In imaginary reward situations, where players receive "points," it is difficult to assess their perceived value to the players. Consequently, generalizability of cooperative-competitive results to non-laboratory settings is limited. In order to increase the probability that subjects in the present study would perceive the rewards as worthwhile, a real reward condition was established (the operationalization is discussed under Procedures).

Personality

The implementation of full communication and real reward conditions within a game theoretic framework is not sufficient to explain

real world conflict; personality variables need to be considered too. Here we depart from the bulk of game theory research. Since game theorists are concerned with rationally conducted conflicts and the purely structural features of games, game theory has emerged as a "depsychologized" decision theory, according to Rapoport (1970). At the same time, because game researchers have been interested in how the game is played rather than who the player is, the relevance of game theory to actors in real conflict situations is dubious. If a comprehensive theory of cooperation-conflict is to be generated within a game theoretic framework, personality variables must be accounted for. We concur with Terhune (1970) that "....personality effects can no longer be discounted, and as we begin to understand how personality operates in lower level cooperation and conflict there is promise that we may be able to fathom personality effects in more complex social phenomena as well."[17]

The personality characteristic dogmatism was chosen as the independent variable in this study for two reasons. First, the results of previous game theoretic studies suggest that traits such as abstractness-concreteness, tolerance of ambiguity, and dogmatism do affect cooperation-conflict behavior, but the effects have not been uniform. For example, Druckman (1967) reported that high dogmatic subjects were less willing than low dogmatics to compromise in a bargaining situation.[18] Terhune (1970) notes that an opposite tendency appeared in a Prisoner's Dilemma study conducted by Grahagan, et. al. (1967) in which dogmatic subjects appeared more "repentant."[19] Hence, we were interested in studying dogmatism within a game theoretic context with the hope that more evidence could be provided for the effect of this characteristic in players.

A second reason for the selection of this personality variable was the nature of the game being played, which was different from the experimental situations in previous studies of dogmatism. Steinfatt has detailed the similarities between the Denny Doodlebug problem, used by Rokeach (1960) to investigate the construct Dogmatism,[20] and features of the Creative Alternative game.[21] Essentially a successful solution to both

the problem and game is dependent on the replacement of certain beliefs with new ones more relevant to the situation at hand. Since high dogmatic persons are less successful in solving the Doodlebug problem than low dogmatic persons, and since success in the CA game is dependent on similar criteria, high dogmatic CA players ought to be less successful in arriving at the creative solution yielding optimum rewards for both players.

Hypotheses

(H_1) On the basis of research reported by Druckman (1967) and Rokeach (1960) we anticipated that high dogmatic pairs in a CA game would be less likely to achieve a creative solution of five consecutive BD responses (which would maximize total points for the pair, but would necessitate sharing points to maximize individual rewards -- a possibility deliberately not mentioned as included in or violating the rules of the game). At the same time, we expected that as the dogmatism level of each pair decreased the two players should be more likely to achieve the creative solution.

(H_2) Moreover, a linear relationship was hypothesized such that as the level of dogmatism increased for each pair the number of points achieved should decline under full communication and real reward conditions. In short, high dogmatics also should be less cooperative than low dogmatics.

(RQ_3) Finally, we were interested in comparing the game behavior of prison inmates with the behavior of college students in previous studies conducted by Steinfatt[22] under similar experimental conditions. Of particular concern were the following dependent variables: (1) proportion of cooperative responses; (2) the number of creative solutions achieved; (3) the pattern of cooperative-competitive moves; (4) apportionment of rewards. Our purpose was to determine if the game behavior of the college student samples could be generalized to the prison sample within a laboratory conflict situation.

METHOD

Subjects

The participants in this research were all members of a college level speech course taught by the senior author at a federal prison in Michigan during the first four months of 1973. The prisoners, twenty-one males, were between the ages of 19 and 30 years. Each student had at least a high school education (or general equivalency diploma) and several had completed some college before their incarceration.

Brief mention should be made of the members' involvement in this class. From the outset of the term it seemed clear that the students had two reasons for coming to class, not mutually exclusive. For some there was a genuine desire to begin a college education while in confinement and complete a degree after release. For all the students, however, there was an immediate goal. Satisfactory performance in such a class was one of only a few possible ways for each man to demonstrate to prison officials and the parole board that he was accomplishing sanctioned "objectives." Hence, his final grades in this course and other classes might serve to help determine (1) how soon he might begin to travel to local colleges for study-release time, and (2) in some cases, how much earlier parole might be granted. The overall effects throughout the course, then, were active participation on the part of all students (for, in addition, only they had been selected for enrollment from more than two hundred other applicants from the prison population) and an intensity at each session not found in most college classrooms. In terms of this investigation, the operationalization of the real reward condition had high salience for the subjects, probably greater than the subjects in previous studies conducted by Steinfatt who were competing only for midterm points rather than an opportunity to facilitate final exam conditions under more stressful conditions.

Procedures

Dogmatism Scores

On the thirteenth week of class, forms containing a modification of Rokeach's (1960) 66-item Dogmatism Scale (Form D) were distributed to the twenty-one students. Form D was used instead of the usual Troldahl-Powell (1965) 20-item Short Form because (1) the reliability for the longer scale (.91) was higher than the short form (.79),[23] and (2) a more precise measure of dogmatism was needed for these Ss who could not readily be called representative of populations usually sampled in field or lab studies.

The dogmatism scores obtained on these seven-point items ranged from a low of 185 to a high of 292. One subject's form was discarded because he alternately marked extreme ends of the scale. The mean score for the twenty forms analyzed was 229.15 ($E\bar{X}$=264), with variance of 32.5. This compared favorably to Rokeach's six-point scale, administered to 137 students at English colleges, where mean score was 219 and variance, 28.3.[24]

Based on these scores, Ss were rank ordered from 1 to 20 (where Rank #1 is the lowest dogmatism score and Rank #20 the highest). Ten pairs of Ss were then formed in which Ranks 1 and 2 were placed together, 3 and 4 together, etc. Partners were therefore paired with someone who was only one score above or below their own (in terms of point values, the average difference in scores between partners was 7 points on the dogmatism scale). These pairings enabled performance of a rank-order correlation with ranking of points achieved by each pair of ranked dogmatics.

Creative Alternative Game

The following week the students met for a final exam. Anxiety was high, since most of the students were not used to taking tests. The author produced a copy of the test and explained that it consisted of twenty-five identification questions worth one point each (the final exam was to be

worth one-quarter of the final grade). At that point, the instructor added that if the class agreed to participate in a "learning exercise" they could forego having to complete each question on the test. The purpose here was to induce a real reward condition. Based on performance in the exercise, the student would be required to answer 25-n questions. Hence, the student would be able to select those questions for which he was best prepared and still achieve the maximum score by having those responses count more. All class members readily agreed to participate.

The twenty Ss were divided into the ten pairs drawn up after analyzing the dogmatism test data the previous week. To insure uniformity persons who had the lower score in each pair were assigned the X position and each partner the Y position.

A large matrix (like the one shown below) was drawn on the blackboard, and the instructor took approximately ten minutes to explain all possible moves and all possible rewards. After several practice trials the researcher specified the exact reward for Ss; for every twenty points won after the 37 game trials were completed,[25] the student would have to do one question fewer on the final exam.[26] Ss were told that they were to hide each decision until their partner had marked his own decision, never to change marks for any reason, and to do each trial independently and simultaneously.

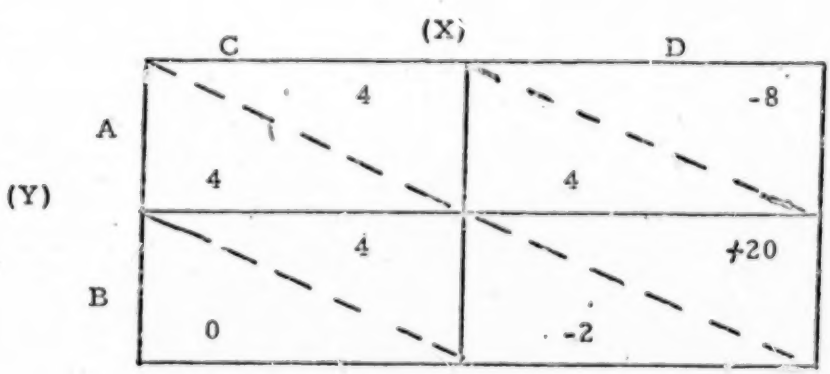

Fig. 1 Steinfatt's Creative Alternative Game

After each pair finished they were interviewed and asked, (1) did they wish to share any of their points with their partner? and (2) had their partner tried to influence them to mark any particular decision at each trial, and, if so, with what success?

RESULTS

Dogmatism--CA Game Relationship

The relationship between dogmatism scores and scores on Steinfatt's Creative Alternative Game was determined in the following manner. It was decided that the Kendall measure of correlation should be used to determine the association between score rankins on the dogmatism test and game score rankings for total points achieved by each pair of players.[27] At the outset, pairs were ranked: Pair #1 (which was comprised of the two persons who had the lowest two scores on the dogmatism test) were assigned a Dogmatism Score Rank of 1; Pair 2 (composed of Ss who had the third and fourth lowest individual dogmatism scores) were assigned a paired Dogmatism Score Rank of 2, and so forth up to Pair #10, who received a Dogmatism Score Rank of 10. Then the total number of points for each player in each game pair was tabulated and added together to form a score of total points won by that pair at the end of the game (the lowest possible score for any pair of players would be -148 if an AD competitive pattern was established on the first trial and continued over all trials, and the highest possible score could be 666 if a BD cooperative response was maintained throughout all trials). Next, these total point scores for each of the ten pairs were ranked from lowest to highest (ranks 1 to 9). Pair #10, comprised of the two highest dogmatics bitterly ended their game after ten trials when player Y abandoned the game after player X would not listen to his pleas for some degree of cooperation. Hence, tau was computed with 9 sets of ranked data to determine if there was a correlation between the two sets of ranks for each pair -- dogmatism and game points achieved.

Analysis of the data revealed a correlation of $r_s = .43$ (corrected for tie game score ranks), or the degree of relation between dogmatism and points achieved by the 9 pairs of Ss completing the game. Since the sampling distribution of r_s under the null hypothesis is known, this correlation is subject to a test of significance. For $r_s = .43$, $p = .0495$ (one-tailed). Hence, the null hypothesis (that the variables are unrelated in the population) is rejected at the level of attained significance, $\alpha = .0495$, and we conclude that dogmatism and game points achieved by pairs tend to be associated in the population from which this sample was drawn. However, the degree of association is modest, clearly. Moreover, the relationship was not in the direction hypothesized (#2). Although H_1 was confirmed -- i.e., low dogmatic pairs achieved more creative solutions than high dogmatics, the point totals by pair tended to increase as dogmatism level increased, rather than the anticipated decreased total with higher dogmatic pairs. Therefore, H_2 is rejected.

Prison vs. College Results

The second purpose of this study was to compare descriptively the results from this sample with Steinfatt's Experiments I - IV conducted with college students. In Experiment I, utilizing real rewards but with a PD game, Steinfatt found an average of 84% cooperative responses over 50 trials for 6 pairs allowed to communicate from the first trial (even when communication was disallowed from trial 12). Ss in this study with prisoners reached a cooperative response rate of 75% over 37 trials of full communication when the number of AC choices were tabulated over the total number of decisions made for the game per pair (74), and then averaged for nine pairs. If the number of BD creative solutions are incorporated into the final percentage, we see cooperative responses to be as high as 94% for the nine pairs of players. The problem, however, is that while the one pair of players who maintained BD responses purposefully throughout the entire game can be said to have been cooperating (Pair #6 -- composed of low dogmatic with scores just below sample $\bar{X}$),

we cannot be sure that the other simultaneous BD responses were due to anything other than chance. Therefore, since the only pair to achieve the criterion measure of five successive BD responses was the one just noted, the actual cooperative responses achieved by the nine pairs (when only these BD responses are included with AC decisions) is 86% -- still almost identical to Steinfatt's results in Experiment I.

In Steinfatt's Experiment II (1972), in which Ss played a CA game for real rewards and were paired by dogmatism scores, two of eight groups in the immediate communication condition established a continuous BD pattern. As mentioned above, one of the nine pairs in the present study established such a pattern. Steinfatt also reported that his other six pairs "tended to fall into a highly consistent response pattern...with only an occasional B or D response breaking up a continuous AC pattern." Once again, this is consistent with the behavior of pairs playing the CA game under similar conditions in this study. Of the eight groups which did not establish successive BD responses, only one pair failed to regularly establish AC choices, with but a few B or D decisions breaking the pattern. That pair, ranked third from lowest on basis of dogmatism scores, never established any particular pattern.

As regards the dogmatism variable in Experiment II, low dogmatic subjects were much more likely to achieve a creative solution than high dogmatic subjects. In the present study low dogmatic pairs (Ranks #1-6) were more likely to achieve a creative solution than high dogmatic pairs (Ranks #7-9). Recall, also that Pair #10, the persons with the highest dogmatism scores in the class, could not cooperate well enough to play the entire game. And just as no individual subject classified as high dogmatic reached a creative solution in the previous research, no pair comprised of high dogmatics in this study reached a creative solution to the CA game.

In Experiment III, Steinfatt and Frye (1972) found that more pairs playing a PD game responded completely cooperatively within the real rewards condition (6 of 18 pairs) than imaginary rewards (3 of 28 pairs).

Though no comparison can be made across different reward conditions in this study, it is interesting to note that 4 of the 10 pairs of players who began the game achieved 100% cooperative responses, much the same proportion as those pairs within the real reward condition in the previous study. Second, for Experiments I and III the highest level of cooperation over all trials was found under conditions of real reward and full communication (84% in Experiment I and 84% in Experiment III). In the present study, as noted above, the findings are quite similar: 86% of responses over all trials in the CA game for all pairs was cooperative.

A CA game was used in Experiment IV, full communication allowed, with the same two reward conditions as Experiment III -- real and imaginary. Study IV was designed to provide a comparison with II, just as III had been compared with I. As has been stated, in Experiment II only two of the eight pairs in the immediate communication condition established a BD pattern, while the others fell into a consistent AC pattern broken occasionally by B or D choices. In Experiment IV, however, ten of the fifteen pairs of college students formed a BD response pattern while the others -- except one pair -- responded principally AC. Although the findings on BD and AC response patterns in the present investigation are consistent with Experiment II, as detailed above, they are not so large as those in Experiment IV. Finally, the only consistent BD respondent pair in the present study agreed to a split of nine points for X and nine points for Y for each trial, while nine pairs reported similar behavior in Experiment IV and seven pairs agreed to a split of ten or eleven points for X, and eight or seven points for Y.

Interviews

During the post-game interviews, players responded that (1) they could not have played the game as they did if they hadn't been able to talk freely; (2) they did not wish to share their points (except for the one consistent BD pair) since most felt they had played "evenly" during the exercise; (3) two of the three high dogmatic pairs had decided from the

outset to mark all AC responses; (4) none of the high dogmatic pairs considered the possibility of BD responses and side payments.

DISCUSSION

Summary

The results of the present study are summarized below. Comparisons are made to the results of Steinfatt's studies with college students.

1. The percentage of cooperative responses for all pairs over all trials in real reward and full communication conditions were similar in the prison and college samples.

2. Low dogmatic pairs in this study behaved much the same as their counterparts in the previous research, and no high dogmatic persons in any study achieved five consecutive BD responses -- the dependent measure for a creative solution -- although even high dogmatic pairs in the prison sample tended to play more cooperatively than did college students.

3. The one pair achieving the creative solution in this investigation split their payoff in the same manner as the majority of those players in the earlier studies.

4. The proportion of game pairs achieving 100% cooperative responses (either AC or BD) across all trials was similar in both samples and two different games.

5. The majority of pairs in all samples not achieving consistent AC responses interrupted those responses with only an occasional B or D choice rather than a burst of BD consecutive responses.

6. Full communication conditions appear to facilitate a creative solution under real reward conditions as determined by Ss statements after the game, but seem not to be as important as the nature of the reward.

Cooperation

Several reasons seem possible for the relatively high percentage of cooperative moves by the prisoners, the dependent variable. First, the members of the class formed a highly cohesive group -- a characteristic not different from the general prison population according to comments

made during the course. These players were probably less likely to desire to maximize rewards at the expense of their partners if they were friendly. This is consistent with Oskamp and Perlman's (1965) interpretation of their results from a PD game.[28] Second, the nature of the CA game guarantees either player a four-point payoff if he chooses A or C, depending on his X-Y position. Hence, any desire to compromise which might have existed was facilitated by these cooperative conditions. Third, the centrality of the dogmatism score in this sample, suggest the possibility that the cooperative responses achieved were merely a function of the clustering of these kinds of dogmatics. Or, put the other way, perhaps the game behavior would have been different had the scores at each end of the dogmatic distribution been higher and lower, or had the bulk of the sample scores been clustered above $\overline{EX}$ in the sampling distribution rather than below it. Finally, at the beginning of the game, one pair of players had asked the instructor if they could also do their exam together after the "exercise" was completed. Not wishing to become involved in the merits of paired work in this study vs. individual exam work, the instructor responded, "We'll talk about that issue after the exercise." It is possible that because no clear negative answer was provided, Ss agreed to cooperate on their game trials in the hopes of somehow being able to cooperate on the exam subsequently.

Dogmatism

The results on the dogmatism variable are partially in line with theoretic expectations and partly incongruent. Given the study's limited sample, only low dogmatic players achieved a creative solution, as anticipated. In contrast to our expectations, increasing levels of dogmatism were positively (rather than negatively) related to increased game points. Two explanations are apparent: (1) two of the three high dogmatic pairs played more cooperatively than was expected; (2) several of the six low dogmatic pairs did not cooperate as well during the game despite their intentions to do so.

As regards the first point, the two high dogmatic pairs settled into an AC cooperative response pattern over all 37 trials. While this fact might indicate that the players were not concerned with competing for maximum individual points, it also is possible that these Ss were playing a "safe" game-- i.e., not breaking rules or adjusting belief systems (to side payments) to maximize group rewards. The players' replies during the post-game interviews suggest the latter interpretation may be correct. They indicated (a) they were content with establishing an AC pattern which appeared to them to be the best way that each player in the pair could skip the most questions on the test; (b) the possibility of splitting points had not occurred to them. The latter reply is in line with our theoretic explanation of dogmatism effects on game behavior, while the former response suggests that the goal of maximizing individual rewards may have necessitated the cooperative pattern. Unlike Druckman's (1967) high dogmatic subjects (who were not playing for real rewards), high dogmatic prisoners in this study may have been willing to compromise in order to achieve what was perceived as maximum individual rewards (the AC pattern).

The low dogmatics, on the other hand, seem to have made very little use of communication in their games. They reported that they were concerned with maximizing group rewards, but instead of establishing an AC strategy at the outset as one low dogmatic pair had done or a consistent BD pattern as another low dogmatic pair, these four pairs tended to play the game only by observing the previous few moves. Many AD or BC responses resulted which minimized points achieved and lowered the game point ranks of the first several pairs. Since, at the same time, high dogmatic pairs achieved more points merely by playing more consistently, the rank order correlation between dogmatism and game point ranks was modest and positive rather than negative.

To summarize, our findings on the dogmatism variable must remain inconclusive. On one hand, dogmatism appears to be related to the

achievement of a creative solution -- the most cooperative response possible. As anticipated, the creative solution was achieved by a low dogmatic pair. However, it should be noted that this was pair #6, just below sample $\bar{X}$; had a median split been used as the cut-off point for high/low dogmatism, these players would have been considered the first pair of high dogmatics. On the other hand, the positive rank relationship between dogmatism and game points per pair indicates that high dogmatics tended to cooperate more than was expected. Several factors have been suggested for this result: (1) the analysis did not include the highest pair of dogmatics who bitterly ended their game, which is consistent with our theoretic explanation; (2) two of the remaining three high dogmatic pairs locked into a response pattern which may have been more a compromise than a desire to cooperate initially; (3) the low dogmatic pairs that did not achieve more points than these high dogmatic pairs (thereby making the rank order correlation positive) failed to utilize communication effectively, but also may not have desired to maximize individual rewards at the immediate expense of a fellow prisoner.

Because of these limiting factors, in light of the creative solution achieved by the low dogmatic pair, and in view of the high dogmatics' reports that they failed to realize the possibility of extra rewards via the creative solution and side payments, we believe that our expectations were correct. In another study, a larger sample, more complexity in the CA game (particularly lessening the player's ability to lock into cooperative responses through compromise), less immediate though equally real rewards, and a more multi-dimensional approach to measuring dogmatism and related personality variables (e.g., employing a tolerance of ambiguity measure which taps dogmatism as well as the cognitive traits) should help to assess more accurately personality differences in cooperation and conflict. Even then, however, it may be a mistake to anticipate a high correlation. Nunnally notes, "In most

prediction problems it is reasonable to expect only modest correlations between a criterion and either an individual predictor test or a combination of predictor tests. People are far too complex to permit a highly accurate estimate of their performance from any practicable collection of test materials."[29] A better use of the post-game questionnaire or interview may help to corroborate trends in the data, and can be used to investigate the trust relationships, power, and bargaining operating during the game. Finally, the use of tape recorders and content analysis may yield useful data on persuasive messages occurring during full communication conditions.

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[14]M. Shubik, "Game Theory: Behavior and the Paradox of the Prisoner's Dilemma: Three Solutions," Journal of Conflict Resolution, 1970, 14, 181-93.

[15]Steinfatt and Miller (op. cit., in press) describe the Creative Alternative Game in more precise terms as follows:

> A CA game may be defined as a matrix in which (a) there exists only one rational choice for one player (0) but a mixed motive situation for the other player (P); (b) but the choice of his best move by 0 must result in only one rational choice remaining for P; (c) the payoff for both players for this semi-forced solution must be equal; (d) the total payoff to both players must be a maximum when both fail to choose their rational alternative (for P this means the alternative which is rational when 0 chooses rationally) and should be on the order of twice the total payoff available from the mutual rational choice cell; and (e) neither player has fate control over the other of the other chooses his rational alternative. Symbollically this may be expressed as $X_1=X_2=X_3=X_6$; $X_1>X_5$; $X_1>X_7$; $X_1>X_4$ $(X_7+X_8)>2X_1$.

Steinfatt contrasts the Creative Alternative game with a traditional game used by game theorists in studying conflict resolution -- Prisoner's Dilemma.

> The CA game is quite different from a PD game. First, it is not semetric since the payoff are not the same for P and 0. Secondly, either player in the CA game can guarantee himself a payoff of 4 units by making choice A for player 0 or choice C for player P (this is not possible in PD, where 0's reward for choice A will be different if P chooses Cor D)... The third major difference of the CA game from a PD game is that one of the cells contains a joint payoff which is greater than the sum of the payoffs for the obvious choice (AC) cell." Italics ours.

[16]See P.S. Gallo, The Effects of Different Motivational Orientations in a Mixed-Motive Game. Unpublished doctoral dissertation, U.C.L.A., 1963. Also P.S. Gallo and G.G. McClintock, "Cooperative and Competitive Behavior in Mixed-Motive Games," Journal of Conflict Resolution, 1965, 9, 68-78.

[17]K.W. Terhune, "The Effects of Personality in Cooperation and Conflict," In P. Swingle (Ed.), The Structure of Conflict (New York: Academic Press, 1970), p. 194.

[18]D. Druckman, "Dogmatism, Prenegotiation Experience, and Simulated Group Representation as Determinants of Dyadic Behavior in a Bargaining Situation," Journal of Personality and Social Psychology, 1967, 6, 279-90.

[19]J. Grahagan, et. al., "Status and Authoritarianism in the Prisoner's Dilemma Game," Paper read at meeting of the Southeastern Psychological Association, Atlanta, 1967. Cited by Terhune in Swingle, (Ed.), p. 210.

[20]M. Rokeach, The Open and Closed Mind (New York: Basic Books, 1960), pp. 171-195.

[21]Steinfatt and Miller, op. cit., in press.

[22]Thomas M. Steinfatt, "The Prisoner's Dilemma and Creative Alternative Games: The Effect of Communication," and Thomas M. Steinfatt and Jerry K. Frye, "The Prisoner's Dilemma and Creative Alternative Games: The Effects of Real and Imaginary Rewards Under Full Communication," Papers presented at SCA Convention (Chicago), 1972.

[23]The reliability for each of these scales is presented in John P. Robinson and Phillip R. Shaver, Measures of Social Psychological Attitudes (Ann Arbor, Michigan: Institute for Social Research, The University of Michigan, 1971), pp. 334-52. For a more detailed explanation of the development of Form D see Milton Rokeach, The Open and Closed Mind (New York: Basic Books, 1960), pp. 71-97.

[24]A 7-point summated scale was used instead of the original 6-point scale Rokeach employed for two reasons: (1) By providing a middle point of "don't know" or "neutral" the researchers hoped to avoid both "forcing" respondents to agree or disagree even a little with a statement upon which they could not accurately state their feelings; (2) As Nunnally points out (p. 521), reliability for a 7-scale steps is generally better than for a 6-point scale (the reliability also tends to level off after 7-points on a scale). See J. Nunnally, Psychometric Theory (New York: McGraw-Hill, 1967).

[25]The decision to have Ss perform 37 trials in the Creative Alternative game stemmed from Steinfatt's (1972) finding that for players allowed to communicate from the first trial to the twelfth (but not subsequently) cooperative responses "dropped only slightly toward the end of the trials" (i.e., between trials 37 and 50 the percentage of cooperative trials dropped only to 81 from 83). Because time was a constraint on the study, it was decided to eliminate the last 13 trials.

[26]In order to compensate for possible ill effects on Ss exam performance of competing for an easier exam under the anxiety producing circumstances surrounding the game, the instructor explained the nature of the study to the students after the trials and interviews were completed and allowed each student to (1) take as a final grade the grade he had earned to that point in the term; (2) take the entire exam with his partner; (3) work on the exam alone, but omit questions based on the number of points he had earned in the game.

[27]A nonparametric statistic was employed, rather than the Pearson product-moment correlation, because it was not possible to assume that the scores being analyzed were from a bivariate normal population: (a) neither the dogmatism scores nor the game behavior data were normally distributed; (b) the warden's policy of selective admission to the course -- by race, education, and length of prison sentence -- made it uncertain whether the Ss were wholly representative of the prison population. Kendall tau was used to analyze the data instead of the other nonparametric measure, Spearman rho, for the several reasons described by W. Hays and R. Winkler, Statistics: Probability, Inference, and Decision (New York: Holt, Rhinehart, and Winston, 1971), pp. 845-49; and Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill, 1956), pp. 213-22.

[28]S. Oskamp and D. Perlman, "Factors Affecting Cooperation in a Prisoner's Dilemma Game," Journal of Conflict Resolution, 1965, 9, 359-74.

[29]J. Nunnally, op. cit., p. 79.